

**What is claimed is:**

1           1. A heterodyne system, comprising:  
2           a first signal path receiving a drive signal and providing a first signal in response to the  
3           drive signal;  
4           a second signal path receiving the drive signal and providing a second signal in response  
5           to the drive signal, at least one of the first signal path and the second signal path scaling the  
6           frequency of the drive signal so that the frequency of the first signal divided by the frequency of  
7           the second signal is an integer ratio; and  
8           a mixer receiving the first signal and the second signal, providing a series of mixing  
9           products of the first signal and the second signal.

1           2. The heterodyne system of claim 1 wherein the series of mixing products includes a  
2           designated signal, and wherein mixing products in the series other than the designated signal are  
3           offset in frequency from the designated signal by integer multiples of the frequency of the second  
4           signal divided by the denominator of the integer ratio when the integer ratio is reduced to lowest  
5           terms.

1           3. The heterodyne system of claim 1 further comprising at least one filter selecting a  
2           designated one of the mixing products in the series.

1           4. The heterodyne system of claim 2 further comprising at least one filter selecting the  
2           designated signal and rejecting mixing products in the series other than the designated signal.

1           5. The heterodyne system of claim 1 wherein the first signal path includes a frequency  
2 multiplier.

1           6. The heterodyne system of claim 1 wherein the second signal path includes a modulator  
2 imposing modulation on the second signal.

1           7. The heterodyne system of claim 5 wherein the second signal path includes a modulator  
2 imposing modulation on the second signal.

1           8. The heterodyne system of claim 5 wherein the frequency multiplier includes cascaded  
2 frequency doublers.

1           9. The heterodyne system of claim 1 further comprising a source providing the drive  
2 signal to the first signal path and the second signal path.

1           10. The heterodyne system of claim 9 further comprising a switchable bypass path  
2 alternatively coupling the designated signal and the drive signal to an output.

1 11. A heterodyne system, comprising:

2 a first signal path scaling the frequency of a received drive signal by an integer multiple

3 to provide a first signal;

4 a second signal path receiving the drive signal and providing a second signal in response

5 to the drive signal; and

6 a mixer receiving the first signal and the second signal, and providing a series of mixing

7 products of the first signal and the second signal.

1 12. The heterodyne system of claim 11 wherein the second signal path includes a

2 modulator for imposing modulation on the second signal.

1 13. The heterodyne system of claim 12 wherein the modulator is an IQ modulator.

1 14. The heterodyne system of claim 11 further comprising at least one filter selecting a

2 designated mixing product from the series of mixing products.

1 15. The heterodyne system of claim 14 wherein the at least one filter has a stopband

2 rejecting mixing products in the series that are offset in frequency from the designated mixing

3 product by integer multiples of the frequency of the second signal.

1 16. The heterodyne system of claim 11 further comprising a source providing the drive

2 signal to the first signal path and the second signal path.

1           17. A heterodyne method, comprising:  
2           receiving a drive signal;  
3           providing a first signal and a second signal in response to the drive signal, wherein the  
4 frequency of the first signal divided by the frequency of the second signal is an integer ratio; and  
5           mixing the first signal and the second signal to provide a series of mixing products of the  
6 first signal and the second signal.

1           18. The heterodyne method of claim 17 wherein the series of mixing products includes  
2 a designated signal, and wherein mixing products in the series other than the designated signal are  
3 offset in frequency from the designated signal by integer multiples of the frequency of the second  
4 signal divided by the denominator of the integer ratio when the integer ratio is reduced to lowest  
5 terms.

1           19. The heterodyne method of claim 17 further comprising selecting a designated one of  
2 the mixing products in the series.

1           20. The heterodyne method of claim 17 further comprising imposing modulation on the  
2 second signal.